

◆ Research paper

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Impact of Mineral Processing and other Industries on Groundwater Quality: A Case Study of Baldia Town, Karachi, Pakistan

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Abstract: The aim of the present study is to assess the groundwater quality of western parts of Baldia Town, Karachi, for drinking purpose. For this purpose, groundwater samples (n = 25) were collected from boring wells at various depths (55–250 feet) for physiochemical analysis. Quantitative assessment was carried out including physical (temperature, pH, Eh, TDS, hardness) and chemical parameters (Na⁺, K⁺, Ca²⁺, Mg²⁺, Fe²⁺, Pb²⁺, Cr⁵⁺, Cu²⁺, Mn²⁺, Co²⁺, Cl⁻, NO₃⁻, SO₄²⁻, HCO₃⁻). Major cations varied in the order of Na⁺ > Ca²⁺ > Mg²⁺ > K⁺ while anions in the order of Cl⁻ > SO₄²⁻ > HCO₃⁻ > NO₃⁻. The concentration of trace elements declined in the order of Ni²⁺ > Fe²⁺ > Cr⁵⁺ > Cu²⁺ > Mn²⁺ > Pb²⁺ > Co²⁺. The analytical results revealed the occurrence of extremely high TDS (Range: 2070 to 6650 mg/l; Mean: 3768 mg/l) and hardness content (Range: 1000 to 3200 mg/l; mean: 1900 mg/l). The pH varied between 6.49 and 7.31 (mean: 6.86), while Eh span between +199 to +473 mV (mean +267 mV). Temperature of the collected groundwater samples was 27±1°C indicating alluvial aquifers. About 52% wells are found to be microbially contaminated. Furthermore, all major ions exceeded the permissible limits set by WHO for drinking water. The mean concentrations of all minor/trace elements were within the permissible limits set by the WHO. The calculated Water Quality Index (WQI = 109) indicated that the groundwater in the study area is unfit for drinking, irrigation, or industrial purposes.

Keywords: Physicochemical parameters, Groundwater quality, Water quality index, Karachi.



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